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## The Strategic Role of E-Commerce in the Supply Chain of the Health Care Industry

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### Abstract

The intent of this research paper is to explore the future role of e-commerce in the health care industry. The impact of e-commerce on the supply chain of the health care industry will be emphasized. The paper will be separated into what role e-commerce plays from the consumers' point of view and at the various levels within the health care industry. With the aging of the population in the United States and other countries, rising health care costs have been a major issue in the respective economies. Efficiency gains within the industry have been attributed to the application of information technology and, most specifically, the Internet. E-commerce as a relatively new technology, if deployed properly, could have significant impact in the cost of the overall delivery of health care. The deployment/maintenance of patient-centered databases will become more manageable. The sensitive issue of patient information will be escalated with the advancement of e-commerce. These and other issues will also be discussed. Special discussion will be included focusing on the lower end of the supply chain, the private provider (physician office), from B2B and B2C points of view. The overall impact on the supply chain in the health care industry will be more than just improvements in efficiency. It will have a fundamental impact on the quality of health services provided and the quality of life. The authors will present surveys on the above-mentioned topics and related issues in this research paper.

### The Rise of E-Commerce

E-commerce, defined as the use of information and telecommunications technologies, including Internet technologies, has emerged in the global economy as a key tool in the drive toward efficiency and effectiveness. E-commerce involves the preparation of a wide array of business transactions by suppliers and end-users. Online technologies are the most significant facets of e-commerce and include the use of the Internet for retailing, banking, electronic settlements, and the sale of both products and services. [8]

Business-to-business (B2B) e-commerce represents the sale of goods and services directly to other firms and government agencies using the Internet. Additional costs can be incurred because of the need to develop, expand and maintain a distribution and transportation system. Business-to-consumer (B2C) e-commerce involves suppliers providing goods and services directly to consumers. Revenue is generated through sales, with additional costs incurred from serving a large, disparate market. [9] Web portals and Internet connectivity where revenue is generated primarily through advertisements and fees, support the growth of both B2B and B2C e-commerce and are designed to entice people to go online for goods, services and information.

There are a number of sound business reasons for the growth in B2B e-commerce. One of the most important reasons is the promise of lower operational expenses primarily from lower transaction costs and faster and more efficient payment from suppliers and/or customers that

means improved cash flow. It is estimated that on average the cost to process a purchase order is \$100, which is all but eliminated with B2B transactions. [4] By streamlining the ordering and shipping process, e-commerce allows just-in-time deliveries, cutting inventories and lowering the holding costs of goods. In addition, e-commerce expands the potential for market research that can decrease the time lag from conception to the opening of markets for new products and services. [8]

Research indicates B2C e-commerce represents 10% to 15% of the total e-commerce market, with business-to-business e-commerce making up the balance. [7] It has been estimated that the e-commerce market is growing at 30 times the rate of the world economy as a whole. A study released in late April 2001 by Shop.org and The Boston Consulting Group Inc. (BBC) found that shopping online retailing in North America grew 66% in 2000 to almost \$45 billion, and is expected to reach \$65 billion by the end of 2001. [11] The demand for goods and services on-line is anticipated to continue to grow, as consumers become more accustomed to turning to the Internet for goods, services and information.

The growth in B2C e-commerce can be traced back to the steadily increasing online population. The number of people in the United States with Internet access rose from 68 million in the first quarter of 2000 to 104 million by the second half. It is estimated that greater than 60% of the US population have Internet access from home or office. An important target population for B2C e-commerce is the adult population age 55 to 64. In April 2001, 42% of this age group used the Internet, up from 36% six months prior. [13] According to a survey by Shop.org, retired seniors, who account for slightly more than 10% of the total Net population, go online an average of 15.9 days a month, more than any other group in the US. [13] Income directly impacts the B2C usage - 80% of households earning more than \$75,000 has Internet access compared to 31% of households earning less than \$30,000. [13]

The Internet has been the catalyst for fundamental change in the way business is transacted, the way customers are targeted, goods and services are ordered and purchased, and information is obtained. Through the application of Internet technologies all aspects of B2B and B2C activities, processes and communication have been integrated and

streamlined. It has transformed banking and financial services, retailing, publishing, travel, manufacturing and entertainment. According to Phil Lohman, First Consulting Group it is inevitable that e-health – the application of e-commerce to health care and pharmaceuticals – will foster new paths of communication and transactions in health care and introduce new patterns and organizational configurations. [7]

### **The Rise of E-Health**

The rise of ehealth takes place in a business environment that is extraordinarily complex, with multiple organizational models subject to multiple regulatory requirements and accreditation standards. Technological advances have revolutionized medical practice at the same time cost-containment strategies have controlled utilization and fundamentally altered the use of scarce health care services. Demographic shifts, not the least of which is the aging of the population, have altered the need for and demand of services. As health care moves to embrace e-health technologies it must address not only these issues but also the fact that the industry lags behind others in the application of advanced information technology. [16]

Even given these factors, health care lends itself to the application of e-commerce strategies because of its size, the current inefficiencies of a paper-based system, and the critical need for up-to-date information. Consumers demand improved access to quality health care information and services, while physicians want to be able to track their patients over multiple care sites and have access to information about the latest diagnostic and treatment options. The industry as a whole, faced with increasing demand and rising costs, must improve its efficiency. E-health promises to create improvements in the delivery of health services for health care providers, consumers and funding organizations and agencies. [8]

The benefits of embracing e-commerce strategies in the health care arena are many, including:

- Improved delivery of services through on-line access to clinical advice, specialists' referrals, diagnostic test results, drug formularies and adverse interactions, and other online health resources.
- Improved clinical outcomes through the application of online technology which monitors patient compliance, drug regimens

and overall health status, and alerts the health professional(s) of needed intervention strategies.

- Improved consumer access to health care information which fosters responsibility for and control over their own health.
- Improved efficiency in the use of scarce physician resources, enabling nurses, physician assistants, and other support personnel to monitor treatment protocols and communicate complications and patient status.
- Improved access to vital patient information through community health information networks at the point of care to reduce cost and improve care delivery.
- Improved processes for the credentialing, performance monitoring and profiling of health care professionals.
- Improved business practices and bottom-line performance through increased market share; medical and pharmacy supply management, contract compliance, and employee productivity.

E-health offers the promise of both increased efficiency and enhanced quality. By developing a community health information network (CHIN), duplication or unnecessary services can be avoided, drug regimens monitored, adverse reactions minimized, practice protocols more easily implemented, and outcomes documented. [16] Through the use of the Internet a community health information network avoids the cost of building and maintaining a pricey, complicated centralized database. The Internet allows physicians and other providers to access, enhance or analyze health data irrespective of the computer platform. Providers may examine laboratory and imaging results, direct or support a clinical team, order prescriptions, and analyze outcomes in real time. [9]

### **The Role of E-Health**

E-health describes the combined use of electronic communication and information technology in the health care sector by the consumer, provider, supplier and payer. For both the consumer and provider, access to the Internet and the myriad of health information it contains has fundamentally altered the physician-patient relationship. Armed with information accessed over the Internet, patients are taking a more intense interest in their own care, and often expect their physicians to

interpret the information that their Internet search uncovered. [6] The use of ehealth and Internet technologies, coupled with advances in medical testing modalities, provide some relief to the physician who faces large patient loads and increasing administrative responsibilities in the managed care world of medicine. It is feasible that physicians eventually will treat common ailments over the Internet and through e-mail, ailments that once required office visits, on-site diagnostic tests, and time-lagged treatment. Information about common ailments contained in or linked to practice web-sites, coupled with e-mail communications between physicians and patients, will save the physician and patient time, improve outcomes by treating ailments before complications, and enhance patient loyalty and retention. [6]

Between 40% and 60% of adult online users search the Internet for health related information. The Internet has played an important role in empowering patients to become involved in their own care decisions. A recent study conducted by the Boston Consulting Group found that patients who use the Internet report that the online information influenced how they managed their care and complied with prescribed treatments. [1] The Boston Consulting Group, in their report, *Vital Signs: The Impact of E-health on Patients and Physicians* categorized patients into four groups:

- *Accepting* (8% of patients) – Rely on physician for health information and decisions.
- *Informed* (55% of patients) – Rely on physicians to make health decisions but utilize the Internet to learn more about a diagnosis or treatment plan.
- *Involved* (28% of patients) – Partner with their physician in making care decisions and seek information online to discuss at each visit; however, they still rely on the physician to make the ultimate decision regarding care.
- *In Control* (9% of patients) – Determine their own care; use online resources to diagnose themselves before visits to determine treatment options they want and to convince their physician to treat them accordingly. [1]

Utilizing this categorization of patients, the Report findings show that while the *involved* and *in control* groups are relatively small, they

account for a significant portion of health care expenditures. Within these two groups are patients tending to suffer from the most severe conditions and therefore most likely to be the heaviest consumer of health care resources. Interestingly they are most likely to be women, who often are the decision-makers regarding health care for their children, spouses and parents. The Report finds that:

Patients have already begun to migrate to more active segments. This suggests that greater patient access to online information is leading to greater patient involvement. Ultimately, if these shifts continue, the more active patients could well become the largest portion of the health care marketplace. [1]

Web-based disease management programs are also an important part in the ehealth revolution, and are designed to alter the delivery of care to patients with chronic medical conditions, including congestive heart failure (CHF), diabetes, and asthma. Disease management programs are designed to use technology to monitor patients daily to determine their health status, to remind them to take their medications, and to handle problems before they become serious. These programs collect data without patients having to come to the office or go to the hospital, allow patients to communicate with their physician and share information with others with the same condition, and have the potential to improve quality as well as control costs. [16] An Independent Practice Association (IPA) in Santa Cruz, California implemented a disease management program for their CHF patients. During the first year of operation, the program saved an average of \$2,400 per patient per year, with overall savings of \$80,000 on professional costs and \$400,000 on institutional costs. [16] McKessonHBOC's disease management program, CareEnhancer(SM) Congestive Heart Failure Program, has demonstrated improved health outcomes, including a 73% reduction in hospital readmission rates for cardiac-related symptoms, as well as a 54% reduction in the average inpatient costs on a per person basis. [13]

Disease management programs overall have helped physicians improve patients' adherence to treatment plans, deliver better care, reduce costs, and enhance overall patient satisfaction. Providers, while recognizing the important role of web-based disease management programs in improving quality and containing costs, have expressed concern over the increased workload. Disease management programs allow a larger caseload, but may not directly reimburse for monitoring patients on-line. [16] To review findings forwarded daily by the case coordinator and recommend changes in the treatment protocol, requires time, time that is not directly paid. Depending on the delivery model sponsoring the program, however, providers can see increased income through the distribution of risk pools – funds set aside to handle unanticipated complications of a covered population. If the population's health can be maintained in the least costly setting (home), risk pool funds that would have been spent on high cost hospital re-admissions and patient complications can be distributed to the physician.

Forrester Research predicts that Internet based health care commerce in the United States will total some \$370 billion by 2004, up from less than \$50 billion in 1999. [16] A major component of this burgeoning market is the online sale of drugs, vitamins, nutritional supplements, vision products and durable medical equipment direct to the consumer. Other revenue is generated through web-based education, publishing, online advertising and the sale of hardware and software to the health care industry. [10] Pharmaceutical companies have also realized the profit potential of e-health. By utilizing the Web, they can directly reach the population with a specific chronic disease, and influence that group's persistence and compliance with medical therapies, including prescription medications. It is important to remember that the age group most associated with chronic diseases (age 55 and over) is the exact same group whose use of the Internet has increased significantly over the last year. [13] By utilizing the Internet, pharmaceutical companies promote patient loyalty for a specific brand that can be leveraged across successive generations of

brands. In addition, by providing online medical support, they gain a competitive advantage on aggregate patient usage, consumer wants and needs, satisfaction, and access to outcome data for research. [2]

Robert K. Jenkin, publisher of *ehealthcare Market Reporter*, predicts that because of its cost savings potential the migration to e-health and the Internet by suppliers and providers will result in savings for employers, insurers, managed care organizations and government sponsored programs. [10] In support of this, in March 2000 five of the biggest suppliers of health care products – Abbott Laboratories, Baxter International, GE Medical Systems, Johnson & Johnson and Medtronic – formed an electronic trading exchange, Global Health Care Exchange (GHX), to transform the way suppliers and health care providers interact. [16] GHX improves supply chain efficiency by eliminating excess costs in the procurement process. Hospitals spend more than \$100 billion annually on products and services, with the average cost of processing a purchase order estimated at \$100 each. [4] In essence GHX becomes a single global marketplace that fully integrates the health care purchaser with diverse supply chain sources. Another example of the innovative use of e-health, Baxter International has initiated a program that allows physicians to access information about their patients remotely using the Internet. It also is testing ways that will allow physicians to monitor the status of their kidney-dialysis patients using home-based web-connected dialysis machines. [16]

### Conclusion

E-health holds the promise of reducing the overall cost of health care while improving access and quality. These positive attributes will become increasingly important when viewed in the context of changing demographic trends. In the last 50 years, while the population increased by 3.5 billion people, the global economy was able to generate an increase in real income of around 3.8% on average. [5] The challenges of the next 50 years will be quite different. By 2050 the number of people over 60 will triple to 2 billion worldwide. As the population ages, the number of young people in the workforce will

decline sharply due primarily to declining fertility rates (number of children per women of childbearing age). [3] Coupled with these demographic trends, there has been an increase in the incidence of obesity, a common risk factor for congestive heart failure and diabetes.

As health care costs continue to rise nationally and globally in light of demographic trends and health status indicators, providers, suppliers and payers will continue to look for innovative ways to become more efficient while maintaining and improving quality. Use of the Internet in innovative ways will continue to develop. E-health, like e-commerce, is transforming the way health care is provided.

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